

User Manual



Power Supply DCP-1500-05

Generalvertretung Deutschland:

TESTEC

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ANNEX A - FST-DCP-1500-05 HIGH VOLTAGE POWER SUPPLY - COMMAND LIST

Any non-authorized modification, repair, tampering or physical damage or if the product has been subject to gross misuse will void this warranty. Elimination of any connections in the earth grounding system or bypassing any safety systems will void this warranty. Parts subject to wear, such as test probes and leads, are not covered by this product warranty, except where they are deemed to have a manufacturing defect within 60 days of the original shipment of the Finero product.



Dear Customer,

Thank you for purchasing Finero test and measurement equipment. Finero is obliged to provide you with the best on the market available test and measurement equipment. The 30 years of Finero experience in most demanding production applications is made available to you in this piece of equipment.

We are confident that this equipment will support your endeavors to keep up the good quality of your production.

If you have any comments about Finero products, software or services I would like to hear of them.

Yours truly,

Risto Vuolle
Chief Executive Officer

Finero Inc.
Kausala, Finland

All information is subject to changes without prior notice.

DELIVERY SCOPE LIST

Although Finero packages the equipment with utmost care you should check the package regarding any delivery damages. If the equipment is damaged you should contact your insurance company directly and inform Finero as well about the matter. Please include photos if possible.

The package should include in minimum following documents and materials:

| | |
|-------------------------|------|
| FST-DCP-1500-05 | 1pc |
| Mains cable | 1 pc |
| User Manual | 1 pc |
| Calibration Certificate | 1 pc |
| HV test lead, red | 2 pc |

1 TECHNICAL INFORMATION

| | |
|---------------------------|--|
| Type: | FST-DCP-1500-05 |
| Serial number: | See back of device |
| Size: | 483x148x410 (width, height, depth) Designed to 19"-eurorack, height 3U 133mm, without legs |
| Weight: | about 25 kg |
| Operation voltage: | 230VAC ($\pm 10\%$) 50Hz 1~phase |
| Operation power: | 800VA |
| Connection: | Cable plug, equipment earth |
| Main fuses: | 4A slow 5x20mm glass inside of power connector |
| Environment temperature: | +5°C...+35°C |
| Environment conditions: | Dry and no dusty |
| Output voltage: | 0V...2000V dc voltage (not filtered, only rectifier) Meter 0...2000V, analogy meter reading 50V |
| Output current: | max. 1000mA, max power 750VA |
| Measurement range: | 0...1000mA |
| Output connections: | Back high voltage sockets |
| Remote control: | Start, stop, test, fail and safety circuit 24VDC D25-female -connector in back panel |
| Computer connection: | RS-232 (assessor) D9 female-connector or IEE488 (assessor) or USB(A) (assessor) in back panel. Board can use controlled other FST-series tester. |
| Tester control connector: | Modular Cat5 8-pin connector 2pcs. This device are possible connection to other FST-series tester (where RS-232 or IEE488 or USB-board are), then are possible control this device via computer. |

2 GENERAL

2.1 Tester

The High Voltage Power Supply is intended for testing of voltage range 0 to 2000 V DC test voltage provided by a 750 VA transformer. The Tester measures the current. The current limit is settable at current range 0 to 1000 mA.

2.2 Tester control modes

The Power Supply can be controlled either locally by means of front panel buttons, indicators and analogy meter or in automatic test systems by a computer via RS-232 or IEE488 or USB connection. Also logic or remote control of basic functions is possible.

2.3 Construction

The Power Supply is built in a 19" frame having height of 3U. The installation depth is about 370 mm. Also front panel components are about 40mm. There are handles of tester both sides and legs below tester. Legs must be taken off if tester assembled to 19" rack.

2.4 Calibration

The Power Supply is factory tested and calibrated to meet the accuracy requirements. The equipment may be calibrated in our factory or by other means agreed separately. There are removed measurement module, which can send to calibrated

2.5 Development

Due continuous development we reserve the right to make technical modifications to our products without notice. Device's activity can deviate to some degree in this instruction from the said resulting customized or other changes.

2.6 Accessories

There are available different accessories, systems and calibrators for test device.

3 SAFETY PRECAUTIONS

3.1 General

The operator should study carefully the instruction manuals and operation of the Power Supply as well as testing instructions for the product to be tested before starting any tests. As safety precaution the operator should be aware of emergency first aid actions.

3.2 High voltage

The high voltage connectors in rear panel have a dangerous high voltage during the test. The current supplied by the Power Supply is high enough to cause convulsion and danger to get trapped on the parts under high voltage.

Depending on principle of the test and equipment used a possibility to touch the high voltage connectors should be avoided by all means. If other pole connected to test device ground the risk for getting electric shock increases. For manual tests we recommend special test heads having heads protected if not in use or use of a special test chamber.

4 INSTALLATION

4.1 General

The Power Supply is designed for standard 19" rack or case. Height is 3U (133 mm). Depth is about 370 mm and connectors need about 150mm space from rear. The handles mounted on the front panel are elevated about 40 mm from the panel. The Power Supply is not allowed to carry from the handles but by having a stable hold in the frame.

The Power Supply can be used in its own case only in dry and clean environment but care must be taken nothing goes into the case through ventilation openings. The ventilation, however, should not be prevented.

4.2 Mounting into 19" module –rack or case

When installed into a rack or a similar case it is mandatory to use mounting rails due to the weight of the device. The holes in the front panel are intended for locking the device in its place not for backing the whole device. If there are legs below of tester, they must take off before installation to 19" rack. Care must be taken of the air circulation in the rack in order to avoid temperature rise above +35°C.

Here are some examples of how build the support for rack installation.



4.3 High voltage connectors

There are three high voltage sockets in back panel. High voltage outputs are in two connector in rear side. "Shield" -connection can use for electrical noise protection. Shield connector decrease errors of the measurement, which comes cables, environmental, line noise or some other leakage currents. If there are errors in measurement, shield line socket must be connected to lower measurement cable shield. This socket can not connected other else lines or direct to high voltage connection. Cables and connectors must be designed to high voltage use.

4.4 External Safety Circuit, Emergency Switches

The Power Supply provides an external safety circuit; which prevents connection of the test voltage, when circuits are open. The safety circuit connector is a part of the external connector. The wiring diagram is shown in tester wiring diagram. When the safety circuit is open the "Fail" -indicator is flashing, if trying start testing.

The safety circuits are not accepted to safety relay system. If there are risks to person, must be use other accepts safety systems. The safety circuits of tester are designed for indication to doors and covers are closed. The safety device shall be potential free contact open when activated. The safety circuit can be wired by small signal cable; the voltage is about 25 V. To take the safety circuit in use a jumper J1(Safety) has to be removed. Location of the jumper J1 are in connection board inside power supply near back edge. The jumper is removed by lifting and can be stored by pressing it to one of the pins. Cables to external control lines are recommend short or use relays near tester.

4.5 Mains supply

The Power Supply is designed for 230 VAC 50 Hz mains. Connect the mains supply in following order:

- Check the position of the front panel POWER switch is 0.
- Connect the control and high voltage cables to the Tester.
- Plug the mains cord to the Power Supply.
- Plug the mains cord to a mains outlet.

5 MANUAL OPERATION

5.1 General

The manual operation means the use of the Power Supply by the buttons, indicators and display panel. At the end of the manual there is a list of malfunctions with possible causes. Caution, there are high voltage in connectors behind tester while test is ON.

5.2 Start-Up

Power is switched on by the “Power” -switch. Dating information is shows few seconds in display panel and then comes tester set values (Ready-display). Power Supply program versions are possible seen, if pressed “Enter” -button when calibration information are in display. There is set value memory, last time saved values are stored in flash memory (no power needed).

Example for “Ready” -display:

| Display | | Meaning |
|-------------------------------|--------------|---|
| READY | LOCAL | Tester are button operated (LOCAL). Current upper limit are 100mA. |
| 100mA/200 VDC range 1000mA | /I [] 2kV | Test voltage is 200Vdc. Ramp up are selected. Current Range is 1000mA and voltage range 2kV |

5.3 Buttons and indicators

There are indicators “Test”, which blinking when test is switched ON and “Fail” indicator for limit values exceeds. Test voltage switched ON with “Start” -button and switched OFF with “Stop” -button. Also there are selector wheel and “Enter” -button for control menu uses.

5.4 Control menu and commands

In display there are shown set values (Ready-display). During the measurement there are also measurement values and after test there are last measurements in display. In Power Supply there are setting menu, which open if pressed few seconds "Enter" -button. Move cursor with selector wheel and make selection with "Enter" -button. To exit from setting menu, simply press "Stop" -button or use command "EXIT" in menu.

Settings -menu:

U-set
I-max
Ramp
Save Remote EXIT

Menu commands

| | |
|--------|--|
| U-set | Voltage setting (0...2000V) |
| I-max | Leakage current high limit value (10mA...990mA) |
| Ramp | Voltage increase method (up ramp or 2 ramp) and ramp time (0; 4...30s) |
| Save | Setting values stored to memory (Yes or No) |
| Remote | Manual or Computer operation (Yes or No) only in remote mode |
| EXIT | Back to "Ready-display" |

5.5 Voltage increase method (Ramp)

There are two different methods to connected high voltage. First (up ramp) make first test ON and the increase voltage step by step to set value. Second (2 ramp) have up ramp and end of test decrease voltage to 0 voltage value before test goes OFF. Ramp time setting are possible 4-30sec. Voltage increase/decrease this time to 0 to setting value and setting value to 0.

5.6 Testing

The high voltage measuring probes will be connected to the device under test. The test voltage is switched on by pressing the "Start" -button. The measurement time recommended at least 1 second. The leakage current and other information can see in display:

| | |
|----------|-------|
| TESTING | LOCAL |
| t=2,5min | |
| U=202V | (200) |
| I=15mA | (100) |

Display is updating all time. Test voltage is switched off by pressing "Stop" - button.

| | |
|-----------|-------|
| TEST OK | LOCAL |
| t=15,8min | |
| U=201V | (200) |
| I=16mA | (100) |

After that the measurements can start again with "Start"-button or return to "Ready" -display pressing "Stop" -button.

5.10 Error displays

Power Supply make alarms if measurements value are not inside limits.

Errors:

CURRENT LIMIT Current is higher than limit (I-max). Tester stops voltage increasing and starts 20s timer. Output voltage cut off after this timer. If current goes lower than limit, alarm disappear and voltage increasing to setting (U-set) value.

POWER LIMIT Tester output power is higher than capacity. Tester stops voltage increasing and starts 20s timer. Output voltage cut off after this timer. If output power goes lower than capacity, alarm disappear and voltage increasing to setting (U-set) value.

LOW VOLTAGE Voltage not goes to set value. Maybe too short test time or high load in connections and same time low test voltage setting.

INTERRUPTED Test is stopped by user.

SAFETY CIRCUIT OPEN Tester safety circuit is open.

ATTENTION

⚡ THE MEASURING HEADS HAVE DANGEROUS HIGH VOLTAGE ⚡

6 OPERATION WITH COMPUTER

6.1 General

This means control of the tester by user interface of a computer. The tester can be included in automatic test systems providing automatic recording of the test results and other applications. All operations are controlled by the computer using commands or easier by using a specific application program Finero Safetest. The command lists for computer operation mode are appendix of this manual. The control board RS-232 or IEE488 or USB are accessory and its must be ordered separately. There are normal only "FST-tester port", which means that tester can be controlled with other FST-series tester (where are communication board)

6.2 Connections

There is 8-pins modular connector for FST-tester port. Connection to other tester must be done shielded Cat5 cables (STP). If there is RS-232 communication board, there are female 9-pins D-connector. IEE488 communication board uses 24-pins connector. USB uses type A female connector. Other FST-series testers can be connected this tester and controlled with one computer.

6.3 Control software

There are available some software, which make controls easier. Programs are accessory and they manuals are inside in Help-menu.

7 REMOTE CONTROL AND LOGIC OPERATION

7.1 General

This means a possibility to incorporate the Tester in a less sophisticated automatic test system. The Tester operates as in the manual mode but has provision for extra output contacts for indicators and logic inputs for the control buttons.

7.2 Start-up

Basically the Tester will be put into operation as in manual mode. In addition the wiring of the operator connector at the rear is to be done. The connector is a 25-pin D-type female connector. In wiring diagram you'll find a diagram and wiring of the equipment ,which can be connected to the connector. Maximum output from +25V are 300mA (7,5W)

7.3 Logic Connections

Contacts are available to show state of test and test result. Also there are two extra outputs, which are possible programmed.

“Test On” output are on, when voltage is on.

“Fail” output are on, when test current is higher than limit value. At the same time the test is interrupted.

The connector has logic inputs like the start and stop buttons. Also there are two extra inputs, which are possible programmed.

“Start” signal switches the test voltage on.

“Stop” signal disconnects the test voltage.

The connector has inputs for the safety circuit, if circuit are open high voltage are not connected.

8 MALFUNCTIONS

8.1 General

If any faults or a malfunction occurs in the operation of the Tester, the following protecting devices and functions should be checked. Printed circuit board fuses are TE5 types and can pull up from socket. Check the fuse by a multimeter and replace with the similar one if necessary.

8.2 No indicator is lit

Check the power cord connectors are properly plugged at both ends

Check the voltage in the mains socket.

Check the main fuses (F1 and F2) of the Tester. The fuses are located in the fuse box below the power cord connector. The box can be opened by removing first the mains cord and then pulling the fuse box about 10 mm outwards. The fuses will be raised slightly. Check the fuse by a multimeter and replace with the similar one if necessary.

8.3 Power indicator is lit but the display is not

Check the fuse of the power unit. Fuses are in control board middle of tester. There are left side two fuses FU1 and FU2.

8.4 Indicators are lit but buttons don't function

Check the safety circuit.

Check set values in "Setting" menu.

8.5 Tester functions but high voltage is missing or voltage output is wrong

There may be overload and then the temperature switches inside of the transformer are opened. Temperature switches are automatic resetting, only waiting some time. The reason for the transformer temperature state must be investigated.

8.6 Tester functions but “External control”-connections not working

Check fuses F1 in external control board. Board is inside tester in back panel.

If the above remedies do not help, contact the Tester service.

9 LIMITED WARRANTY

All of our products and test systems are covered by a standard 12-month warranty period. The warranty period starts on the original shipment date of the product or test system. Our product and test system warranties guarantee that our products will be free from defects in material and workmanship and we will repair or replace any such Finero product or test system we find to be defective.

All new Finero products and test systems are calibrated prior to shipment. Finero products and test systems require annual calibration, if Finero has not given any other written instruction, and Finero accepts only calibrations made by an approved Finero partner or by Finero factory.

If your product during the 12-month warranty period fails to perform as Finero has specified please return the product to the below address or to one of our approved partners.

Warranty work includes parts and labour at Finero's cost, but excludes shipping costs. Finero products returned for warranty repair and found to be in proper working order may be subject to a shipping and handling fee.

Any non-authorized modification, repair, tampering or physical damage or if the product has been subject to gross misuse will void this warranty. Elimination of any connections in the earth grounding system or bypassing any safety systems will void this warranty. Parts subject to wear, such as test probes and leads, are not covered by this product warranty, except where they are deemed to have a manufacturing defect within 60 days of the original shipment of the Finero product.

Except as provided herein, Finero makes no warranties to the purchaser of Finero products and test systems and all other warranties, expressed or implied (including, without limitation, merchantability or fitness for a particular purpose) are hereby excluded, disclaimed and waived.

FINERO SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT CONSEQUENTIAL, INCIDENTAL OR OTHER SIMILAR DAMAGES SUFFERED BY THE PURCHASER OR ANY THIRD PARTY, INCLUDING WITHOUT LIMITATION, DAMAGES FOR LOSS OF PROFITS OR BUSINESS OR DAMAGES RESULTING FROM USE OR PERFORMANCE OF THE PRODUCT OR TEST SYSTEM, WHETHER IN CONTRACT OR IN TORT, EVEN IF FINERO OR ITS AUTHORIZED REPRESENTATIVE HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, AND

FINERO SHALL NOT BE LIABLE FOR ANY EXPENSES, CLAIMS, OR SUITS ARISING OUT OF OR RELATING TO ANY OF THE FOREGOING.

Due to continuous development of the products warranty does not include updating of features.

When the warranty repair is booked the customer is requested to inform type and serial number of the equipment and description of the malfunction as detailed as possible. The repair shall be carried out in reasonable time during normal working hours. If immediate repair is demanded or done outside of normal working hours the extra costs may be born to the customer account. The warranty repair are done primarily at the manufactures premises.

Return address: Finero Oy, Service and Calibration, Haltonintie 5, FIN-47400 Kausala, FINLAND

ANNEX A

HIGH VOLTAGE POWER FST-DCP-1500-05

COMMAND LIST

NOTICE!

**IF YOU HAVE ORDERED A COMPUTER INTERFACE WITH YOUR
FST-EQUIPMENT THIS ANNEX IS RELEVANT FOR THE
PROGRAMMING**

RS-parameter: Baund rate 19200, 8 data bits, 1 stop bit, no parity

Summary of Tester Commands:

| | |
|---------------------------|---|
| DCP | Commands are use to FST-DCP tester |
| VOLTage 1000 | Voltage set value 0...2000 (=0...2000V) |
| CURRent:MAXimum 90 | Current high limit 100...990 (=10mA...990mA) |
| RAMPtype 0 | Voltage increase or decrease type (1=up, 2=up and down) |
| RLENght 5 | Voltage increase or decrease time (0;4...30sec) |
| ON | Test voltage on |
| OFF | Test voltage off |
| ALARm:ON | Tester alarm (software) |
| ALARm:OFF | Tester alarm off (software) |
| OUT1:ON | External control OUT1 ON or OFF |
| OUT2:OFF | External control OUT2 ON or OFF |
| IDN"" | Tester identify code, maximum 20 characters |
| | |
| RES? | Results: Current, voltage, status and test time |
| CURR? | Measurement current |
| VOLT? | Measurement voltage |
| STAT? | Tester status |
| TIM? | Test time and hole test time in 1/10 minutes (0...9999) |
| OUT? | External controls output 1 and 2 status |
| IN? | External control input 1 and 2 status |
| CAL? | Tester testing/setting date |
| VER? | Tester version |
| IDN? | Tester identify code |

Tester commands, specification and examples:

DCP All next commands are use to FST-DCP tester (high voltage power).

Example:

DCP;VOLT 1000;ON Command to power and test voltage 1000V and test voltage output ON

VOLTage mmm Setting test voltage (0V...2000V).
mmm= test voltage

Examples:

VOLT 1000 Test voltage 1000V
VOLT 240 Test voltage 240V

CURRent:MAXimum Setting current high limit value (10...990). (=10..990mA)
mmm=current high limit
If measurement value exceed high limit, voltage increasing stops and “current limit” goes display and timer counts 20s→ 0s. If current goes lower, voltage are increased to set value. If alarm are 20s, voltage goes off and tester makes alarm and status 1 bit 1 (test fail) and status 2 bit 0 (20s timeout) and bit 3 (current limit) settings up.

Examples:

CURR:MAX 100 Current high limit 100mA
CURR:MAX 990 Current high limit 990mA

RAMPtype m Test voltage increase/decrease style 1 or 2. 1=voltage connected slow (increase are controlled) and unconnected to direct to 0.
m=style 2=both are controlled.

RLENgth mm Test voltage increase/decrease time (0)4...30 seconds.
mm=time

Example:

RAMP 1 Voltage increase slow and decrease fast
RLEN 15 Voltage increase time are 15s
RLEN 0 Maximum speed

ON Test voltage on and measurement starting. (same like Start-button). Remove same time ALAR:ON command effect. Reset some status bits (see STAT?).

Example:

DCP;VOLT 500 Commands to power, test voltage 500V,
CURR:MAX 100 current high limit 100 mA, test
ON voltage on and measurements starts.

OFF Test voltage off. (same like Stop-button). If test voltage are "ON" before command, then voltage goes off (test ok -display). If test are off before command, tester display setting values (ready – display). Reset some status bits (see STAT?).

Example:

HVT;VOLT 500 Commands to power, test voltage 500V,
CURR:MAX 100 current high limit 100mA, test
ON voltage on and measurements starts.
Test time loop
OFF Test stop

ALARm:ON Stops testing and set Fail indicator on and buzzer ringing about 1 seconds. Used for software fail- alarm.

Example: ALAR:ON

ALARm:OFF Tester Fail indicator off

Example: ALAR:OFF

OUT1:ON External control output 1 on

OUT2:ON External control output 2 on

OUT1:OFF External control output 1 off

OUT2:OFF External control output 2 off

IDN " " Tester identify code (free setting), maximum 20 characters (not "-marks). Normal there are tester type and serial number.

Example: IDN "FST-DCP sno 12345"

RES? Give test results: leakage current, test voltage, status byte 1, test time. Return answer four numbers : aa bb cc dd

| | |
|----|---|
| aa | Current (0...1100), 10999=range high limit, -1= can not measure |
| bb | Test voltage (0-2000) |
| cc | Status byte 1 (see STAT?) |
| dd | Test time from measure starting (0..9999=0..999min) |

Example:

| | |
|--------------|---------------------------------------|
| DCP;VOLT 500 | Commands to power, test voltage 500V, |
| CURR:MAX 100 | current high limit 100mA, test |
| ON | voltage on and measurements starts. |
| RES? | Test results inquiry |
| OFF | Test stop |

CURR? Test voltage, return answer in real voltage in test. (0...1100)

Example:

| | |
|--------------|---------------------------------------|
| DCP;VOLT 500 | Commands to power, test voltage 500V, |
| CURR:MAX 100 | current high limit 100mA, test |
| ON | voltage on and measurements starts. |
| CURR? | Test current inquiry |
| OFF | Test stop |

VOLT? Test voltage, return answer in real voltage in test. (0...2000)

Example:

| | |
|--------------|---------------------------------------|
| DCP;VOLT 500 | Commands to power, test voltage 500V, |
| CURR:MAX 100 | current high limit 100mA, test |
| ON | voltage on and measurements starts. |
| VOLT? | Test voltage inquiry |
| OFF | Test stop |

STAT? Tester status. Return answer two status bytes mmm nnn. Reset some bits.

| mmm | | Status byte 1 | |
|-----|-------|-------------------------------|-----------|
| Bit | Value | Meaning | Resetting |
| 0 | 1 | Test OK | ON/OFF |
| 1 | 2 | Test FAIL | ON/OFF |
| 2 | 4 | Tester are in local-operation | |
| 3 | 8 | Safety circuit open | |
| 4 | 16 | Communication error | |
| | STAT? | | |
| 5 | 32 | Tester function error | |
| | STAT? | | |
| 6 | 64 | Voltage setting running | |
| 7 | 128 | | |
| nnn | | Status byte 2 | |
| Bit | Value | Meaning | Resetting |
| 0 | 1 | 20s timeout | ON/OFF |
| 1 | 2 | 750W power limit | ON/OFF |
| 2 | 4 | Low test voltage | ON/OFF |
| 3 | 8 | Current limit fail | ON/OFF |

| | | | | |
|-------|---|-----|-----------------------------|-------|
| | 4 | 16 | Communication error MM-DCP | STAT? |
| | 5 | 32 | Communication error RS-DCP | |
| STAT? | 6 | 64 | Communication error DNN-DCP | STAT? |
| | 7 | 128 | Communication error PC-RS | |
| STAT? | | | | |

Example:

| | |
|--------------|--|
| DCP;VOLT 500 | Commands to power, test voltage 500V, |
| CURR:MAX 100 | current high limit 100mA, test |
| ON | voltage on and measurements starts. |
| STAT? | Tester status inquiry. If status byte 1 are 1 or 2, test are done. If status byte 1 are 1, test are done without fails. If status byte 1 are 2, tester are makes fail and status byte 2 send reason of failing |
| RES? | Results inquiry |

TIM? Testing time in 1/10 minutes. Return answer two numbers : aa bb

aa test time from measure starting (0..9999=0..999min)
bb 0 = timer not use

OUT? External control outputs status. Return answer two numbers : aa bb

aa Output 1 status (0=off, 1=on)
bb Output 2 status (0=off, 1=on)

IN? External control inputs status. Return answer two numbers : aa bb

aa Input 1 status (0=off, 1=on)

bb Input 2 status (0=off, 1=on)

CAL? Tester adjustment date. Return answer dd.mm.yyyy
(=27.08.2001)

DCP;VER? Tester inside circuits (pcb) and software versions.

Example:

RS-4122v1/v1.1 MM-4184v1/v1.0 HV-4213v0/v1.0 DNN
4074v4/v2.0

IDN? Tester identify code. Return answer from tester free setting code, maximum 20 character. Finero are setting tester type and serial number.

Example: DCP-1500 sno: 647307